

ORDERDEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

8150.1A

9/21/87

SUBJ: TECHNICAL STANDARD ORDER PROCEDURES

1. PURPOSE. On June 2, 1980, the FAA adopted a new procedure to expedite the issuance of Technical Standard Order (TSO) standards. Federal Aviation Regulations (FAR) Part 37 was revoked and the administrative procedures for TSO's transferred to FAR Part 21, Subpart 0. This order contains instructions for use by the field offices in administering the TSO compliance program.

2. DISTRIBUTION. This order is distributed to the branch level in the Office of Airworthiness and the Office of Flight Standards; to the branch level in the regional Aircraft Certification Offices and Flight Standards Divisions; FAA Academy, Flight Standards Branch; to the division level in the Aviation Standards National Field Office; all Air Carrier, General Aviation, and Flight Standards; all International Field Offices, International Aviation Field Offices, Aircraft Certification Field Office, Manufacturing Inspection District/Satellite Offices.

3. CANCELLATION. Order 8150.1, Technical Standard Order Procedures, dated May 19, 1970, is canceled.

4. EXPLANATION OF CHANGES.

a. References to FAR Part 37 have been deleted and new references made to FAR Part 21, Subpart 0, as appropriate. Changes have also been made to reference current FAA orders and forms.

b. The Field Office responsible for issuing the TSO design authorization may grant a deviation for the manufacturer to use Radio Technical Commission for Aeronautics (RTCA) Document No. DO-160 to enable a TSO applicant the use of the current documents in lieu of older environmental test procedures and criteria in the TSO provided that there is not a mixing of environmental conditions and test procedures; i.e. use one document.

c. Recommendations for new TSO's or changes to existing TSO's should now be submitted to Office of Airworthiness, Aircraft Engineering Division, Technical Analysis Branch, AWS-120.

d. Paragraph 17 reflects a new requirement for only one copy of the technical data to be submitted by a TSO applicant, thereby superseding the requirement within any specific TSO for a different number of copies.

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Initiated By: AWS-120

e. Paragraph 20 has been added to provide guidance when the holder of TSO authorization changes names.

f. Paragraph 21 provides guidance for identification of TSO articles which are modified by persons other than the TSO manufacturer.

g. Significant changes to FAR Part 21, Subpart O are as follows:

(1) FAR Section 21.601(c) contains new information to indicate that the Administrator does not issue a TSO authorization if the manufacturing facilities for the product are located outside of the United States, unless the Administrator finds that the location of the manufacturer's facilities places no undue burden on the FAA in administering applicable airworthiness requirements.

(2) FAR Section 21.611 reflects a new provision that minor design changes may be identified by part numbers. The changed article still carries the original model number.

5. APPLICATION OF THIS ORDER.

a. Administration of the TSO compliance program is the responsibility of the regional offices. Regional offices control and monitor all manufacturers producing articles in conformity with the provisions of FAR Part Section 21.601(a), including the assumption of responsibility for all holders of TSO approvals previously issued by the FAA under FAR Part 37. Subpart O of Part 21 sets forth the general TSO rules. The individual standards prescribed for specific types of articles will be available from AWS-120 and at all regional Aircraft Certification Offices (ACO's).

b. This order contains instructions for use by the field offices in administering the TSO compliance program.

6. RESPONSIBILITIES OF AIRCRAFT ENGINEERING DIVISION. The issuance of procedures, policy guidance instructions, and effectiveness and uniformity of the full program is the responsibility of the Aircraft Engineering Division, AWS-100; however, the directorates are obligated to make recommendations based on needs and experience in the application of the system. The Aircraft Engineering Division will record and monitor all deviations requested and granted from the TSO standards, as provided under FAR Sections 21.609 and 21.617 in order to determine that appropriate amendments are made to the standards to suit new and changed conditions. The Aircraft Engineering Division will prepare final documentation for publication of TSO's.

7. RESPONSIBILITIES OF AVIATION STANDARDS NATIONAL FIELD OFFICE. Advisory Circular (AC) 20-36, Index of Articles (Materials, Parts, Processes, and Appliances) Certified under the Technical Standard Order System, is an index of TSO authorizations issued. AC 20-36 will be compiled and published by the Aviation Standards National Field Office on an annual basis.

8. RESPONSIBILITIES OF DIRECTORATES AND FIELD OFFICES. The ACO's are responsible for the field administration of the TSO compliance program which includes:

- a. Receiving and processing applications for TSO authorizations (FAR Sections 21.605 and 21.617).
- b. Confirmation of validity of applicant's certification of compliance with the performance standards of the TSO.
- c. Confirmation of applicant's ability to produce duplicate articles in accordance with FAR Sections 21.605(c) and 21.617.
- d. Issuance of authorization or denials to the applicant within 30 days as provided under FAR Section 21.605.
- e. Maintaining full and accurate records and files of authorizations granted, technical data, design change approvals, service difficulties, noncompliance actions, and terminations.
- f. Providing AWS-100 and the regions with information, recommendations, and data as specified in this order.
- g. Conducting technical evaluations of all requests for deviation in accordance with Section 21.609 and providing AWS-100 with recommendations for grant or denial as appropriate.
- h. Report all new TSO authorization holders and changes to AVN-110.

9. EVALUATION OF APPLICATIONS AND DATA FOR COMPLIANCE WITH THE PERFORMANCE STANDARDS OF THE TSO.

- a. When an application for authorization to produce an article under the TSO procedures is received, all incoming material should be checked promptly to determine that documents and all data conform to the stated provisions of FAR Section 21.605.
- b. All data furnished should be examined promptly to ascertain that the technical data requirements specified in the applicable TSO are met. Any omissions should be called to the attention of the applicant promptly in writing, in accordance with FAR Section 21.605(d).
- c. A check of the adequacy and validity of technical data, procedures, tests, and test results should be undertaken where such an examination appears to be justified. In normal circumstances, when the applicant is known to have experience and technical competency, only a cursory check need be made. Drawings and prescribed equipment installation information and specified limitations should be checked for completeness and adequacy since such data are important to evaluation of aircraft type designs as well as for determination of the ability of the applicant to produce duplicate articles in accordance with FAR Section 21.605(c).

d. It is recommended, particularly in the case of new TSO manufacturers, that an engineer visit the applicant's facility for the purpose of appraising the applicant's competence to certify conformance with the TSO. The engineer should assure that compliance tests, as prescribed, are being realistically conducted. This visit should take place, preferably within the 30-day period before an authorization is granted. A program of annual visits by engineers from an ACO to all its TSO holders in a region is desirable to verify that the manufacturers continue to comply with the performance standards of the TSO, particularly with respect to design changes as prescribed by FAR Section 21.611.

e. The use of Designated Engineering Representatives (DER's) for the purpose of conducting the prescribed evaluation (paragraph 9 of this order) of TSO authorization application and data submitted with the manufacturer's certification of conformance is not permissible. A DER certification would be a meaningless duplication of the certification by the manufacturer (the employer) which is already on file with the FAA.

10. EVALUATION OF QUALITY CONTROL DATA.

a. When an application for authorization is received from a manufacturer, a project production number should be established by the Aircraft Certification Office and forwarded to the Manufacturing Inspection District Office (MIDO) (reference Order 1380.4, Standard Procedure for Uniform Reporting - Engineering and Manufacturing Activities, for production project establishment).

b. The description of the manufacturer's quality control system (FAR Section 21.605(a)(3) in accordance with Section 21.143) will be forwarded promptly by the manufacturer or an authorized agent to the ACO having jurisdiction over the geographical area in which the authorized agent is located. The ACO should forward the description of the quality control system to the appropriate MIDO. The district office will conduct their evaluation in accordance with Order 8120.2A, Production Approval and Surveillance Procedures.

c. In the event the quality control data does not meet the requirements of FAR Section 21.605(a)(3), the applicant should be advised to contact the nearest MIDO. That office should assist the applicant as necessary in reconciling all unsatisfactory conditions.

11. TSO AUTHORIZATION (FAR Section 21.605). This authorization issued in letter form should state that the FAA authorizes the applicant to identify the articles with the applicable TSO marking based on the applicant's certification of the acceptability of TSO-CXX in conformance with FAR Part 21, Subpart O, and on the FAA determination that the quality control data complies with the requirements of Section 21.605(a)(3). All data should be specifically identified in the letter of authorization. A copy of each TSO authorization issued by a region shall be forwarded to the MIDO responsible for inspection and surveillance over the manufacturer and FAA Aeronautical Center, Aviation Standards National Field Office, Engineering and Manufacturing Branch, AVN-110.

12. TSO INDEX. The "Index of Articles (Materials, Parts, Processes, and Appliances) Certified Under the Technical Standard Order System" will be compiled and revised annually by the Aviation Standards National Field Office, Engineering and Manufacturing Branch, AVN-110. Copies of letters where the authorization has been denied need not be forwarded to AVN-110.

13. APPROVAL OF DEVIATION FROM PERFORMANCE STANDARDS (FAR Section 21.609).

a. Usually requests for deviations are made because the TSO performance standards are restrictive or become otherwise unsuitable due to developments and changes in a particular case. Generally, it is desirable that any deviations granted to an applicant be promptly reflected in the TSO by appropriate change of the performance standards. Since the basis for establishment of a particular standard is generally not known in the ACO, prior approval by the Aircraft Engineering Division, AWS-100, is necessary.

b. Requests for deviations from the TSO standards will be forwarded to AWS-100 for review. A deviation is anything that does not meet the specific criteria of the TSO, even though the ACO may feel the "intent" is met. Accompanying the request should be substantiating data which specifically covers the compensating factors which the applicant contends provides an equivalent level of safety to that provided by the TSO. The ACO should express a firm conviction to AWS-100 as to whether or not the deviation should be issued, along with their reasons. After review of all information, AWS-100 will inform the ACO, in writing, of its decision concerning the acceptability of the deviation request. The ACO will then issue a grant or denial of the deviation, to the applicant, based on AWS-100 decision. The ACO will provide AWS-100 with a copy of the letter which was sent to the applicant. All requests for deviations should be acknowledged promptly by the ACO. The 30-day limitation of FAR Section 21.605 is not applicable to deviation requested as the application is automatically deficient in respect to the TSO requirements. In the specific case of environmental test procedures and criteria, the ACO may approve, without AWS-100's coordination, any request by an applicant to use Document DO-160, including the latest revision, in lieu of the environmental test procedures and RTCA criteria specified in the TSO. Mixing of environmental conditions and test procedures from different documents such as part from DO-160 and the remainder from DO-160B or a SAE document, is not acceptable.

14. RECOMMENDATIONS FOR NEW TSO's OR FOR CHANGES TO EXISTING TSO's. Whenever a need is found for the establishment of standards for an article not already covered by a TSO, a recommendation to this effect should be submitted promptly to AWS-100. Manufacturers should be encouraged to provide suggested standards, in whatever form they find most convenient (procurement specification proposed TSO draft, etc.), to the FAA to expedite their development. Requests for revisions to the TSO standards recommended by either manufacturers or the ACO should be accompanied by substantiating data to justify the change. If service experience with a particular TSO shows the standards to be inappropriate or inadequate in any respect, revisions to the standards should be recommended.

15. SERVICE DIFFICULTIES AND NONCOMPLIANCE (FAR Sections 21.3 and 21.619).

a. Service difficulties concerning each article of TSO equipment will be evaluated as necessary by the ACO issuing the TSO authorization for the equipment involved. Reports indicating quality control problems will be forwarded to the responsible MIDO for investigation without delay by the ACO Manufacturing Inspection Branch or Section. Statistical data, mechanical reliability reports, and related sources will be used in conjunction with the manufacturer's data and recommendations in determining the justification for the issuance of either a service difficulty report or an airworthiness directive (AD). However, an AD must be issued under the conditions specified in FAR 39 (refer to Order 8040.1A, Airworthiness Directives (latest edition) for details of AD preparation), and action taken in accordance with Section 21.619.

b. The ACO will investigate all reports of noncompliance with FAR 21, Subpart O, and the applicable TSO standards and take corrective action where necessary. Title IX, Section 901 of the Federal Aviation Act provides for a civil penalty for any person who violates any provisions of Title VI, Section 601.

c. Allegations of noncompliance should be investigated promptly and thoroughly. A complainant should be requested to furnish full facts, names, place, etc., as evidence to support the claim. Depending on the facts and circumstances, testing for the purpose of development of evidence may be necessary. In instances where noncompliance is found and the manufacturer does not correct the area of noncompliance, the procedures in Order 2150.3, Compliance and Enforcement Program, should be followed and action taken in accordance with Section 21.619.

16. DESIGN CHANGE TO A TSO ARTICLE (FAR Section 21.611).

a. Each ACO should audit the manufacturer's submittal of minor change to confirm it is a minor data change. If review shows that the submittal is a major change the ACO should notify the manufacturer to comply with FAR Section 21.611(b) and notify the MIDO to take action regarding the marking discrepancy.

Manufacturers of TSO articles must be made aware that any changes whether major or minor, must be properly substantiated. If a change of design has been made which is contrary to the provisions of FAR Part 21, the manufacturer holding the TSO authorization is responsible to show that the change of design still meets the requirements of the applicable TSO Standards. When the manager of the ACO having jurisdiction becomes aware of a design change which has not been substantiated by the manufacturer, he should officially request that the manufacturer provide the required substantiation. Depending on the extent of the design change such substantiation may necessitate complete retesting to show compliance with the TSO requirements.

b. Application for TSO authorization for changes to the design of a TSO article made by persons other than the manufacturer are handled pursuant to FAR Section 21.611. If the design change is being made to an article which has already been in service or has been in storage long enough to have experienced possible deterioration, particular attention should be given to determining that the inspection and testing accomplished assures that the complete changed article continues to meet the TSO requirements.

17. REGIONAL DATA FILES, RECORDS, ETC.

a. The issuing ACO is required to maintain a master file of all data submitted by an applicant in connection with obtaining and continuing an authorization under the TSO system. The manufacturer is required to submit only one copy of the technical data for the applicable TSO. The issuing ACO will furnish, upon request, copies of the technical data to other ACO's. In distributing technical data, it would be helpful to state on the transmittal which TSO is applicable.

b. In the event the business is terminated or no longer operates under the provisions of the TSO system, copies of all data transferred by the applicant to the ACO's for record purpose are to be retained for a period of at least 5 years. The data then may be disposed of in accordance with current prescribed procedures (FAR Section 21.613).

18. INCOMPLETE SYSTEMS AND MULTIPLE-USE SYSTEMS.

a. A component part of a complete system may be approved and TSO authorization issued for only that part, provided:

- (1) the TSO is appropriate and adequate for that part, and
- (2) the part provides a major function of the complete system or the principal function of the part is necessary to the system function, and
- (3) appropriate instructions and limitations for use are made available.

An example is a VHF communications antenna which may be properly used with any TSO-C37 VHF transmitter. If specific items must be used with the approved part to make up a complete working system, then the manufacturer should provide appropriate instructions and/or limitations regarding such usage. An example is a "Model ABC control and display head" which, due to practical interface limitations, may be used only with a "Model XYZ area navigation system."

Another example is the Electronic Flight Instrument System (EFIS) which, may be properly used with TSO-C4, Bank and Pitch Instrument. The EFIS displays "Bank and Pitch" information, but the EFIS does not include a vertical gyro. Since the EFIS provides a major part of the TSO-C4 functions, an authorization may be granted to label components TSO-C4.

b. A complete system which performs multiple functions may be handled as follows:

(1) Function complies with TSO. Approval may be granted and TSO authorization issued for EACH function (for which there is a TSO) which meets all the requirements of that TSO, provided the function being performed is the principal function required by the TSO.

(2) Function does not comply with TSO. If a function provided by the system does not meet all requirements of a TSO (which is applicable to that function), the system should be appropriately labeled to indicate that fact, i.e.. "This unit is not approved as a TSO-CXX (attitude instrument)."

(3) No applicable TSO. In the case where there is no TSO appropriate to a function of the system, the TSO authorization for other functions should not refer to that function, and that function should be evaluated under the type certification procedures when installation approval is sought.

19. ISSUE OF LETTERS OF TSO DESIGN APPROVAL, IMPORT APPLIANCES
(FAR Section 21.617)

a. Letters of TSO design approval are issued in accordance with Section 21.617 to foreign manufacturers for appliances which the United States has agreed to accept for export and import providing such appliances conform to Section 21.502, and a copy of the technical data has been submitted through that country's Civil Aviation Authority.

b. TSO deviation requests from a foreign manufacturer of an appliance may be granted by the Administrator providing the TSO performance standards become unsuitable due to technological developments, and such changes provide an equivalent level of safety. The request for approval to deviate and all pertinent data must be submitted through the Civil Aviation authority in that country to the FAA.

c. The marking requirements for appliances approved under a design approval shall be identified as described in Section 21.607 and the applicable TSO.

d. Each appliance must be accompanied by a Certificate of Airworthiness for Export issued by the Civil Air Authority of the country of manufacture.

20. NAME CHANGES OF TSO HOLDERS. When there is a change in a TSO holder such as a name change and the MIDO determines that the change has no significant effect on the Quality Control System (or the procedures to assure compliance with FAR Part 21, Subpart O, including FAR Section 21.143), such change is considered to be an administrative change and the following procedure should be followed: The TSO holder should provide the appropriate Aircraft Certification Office with a list of its TSO authorizations. The ACO should then update Advisory Circular 20-36, "Index of Articles (Materials, Parts, Processes, and Appliances) Certified under the Technical Standard Order System" in accordance with paragraph 7 of this order.

a. In cases where a MIDO has determined that there is significant effect on the Quality Control System and procedures, the ACO should terminate the TSO authorizations. The TSO authorizations may be reinstated under the new name when compliance with the applicable regulations has been shown.

b. A name change is when a company changes its name with no other changes to its internal structure or ownership. This is considered an administrative change. The company would maintain its TSO authorization, and provide the appropriate ACO a list of its TSO authorizations.

c. If a company is bought out by another company this is considered changing hands. The MIDO should determine if there is a significant effect on the Quality Control System and procedures, and the ACO should terminate or reinstate the TSO authorization.

d. The TSO should be reinstated at the revision level it was terminated, unless a new TSO has been issued stating that no new authorizations should be made to the old TSO (If TSO-CXXb supersedes TSO-CXXa).

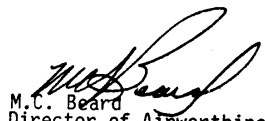
21. IDENTIFICATION OF TSO ARTICLES WHICH ARE MODIFIED BY PERSONS OTHER THAN THE TSO MANUFACTURER. FAR Section 21.611(c) permits design changes to a TSO article by persons other than the manufacturer who submitted the statement of conformance. If the design changes are approved under Part 43 or under the provisions of the applicable airworthiness regulations the following identification requirements should be applied to the altered TSO article:

a. The modifier's nameplate should be added without removing the TSO identification from the original manufacturer's nameplate if:

- (1) the original manufacturer has notified the FAA that the modified article continues to meet all requirements of the TSO; or,
- (2) the modifier certifies to the FAA, based on his tests and investigations, that the modified article continues to meet all requirements of the TSO.

b. If the modified article does not continue to meet the requirements of the TSO, the TSO identification on the original manufacturer's nameplate should be permanently obliterated in such a manner that it cannot be restored. Such articles would have to be approved as part of an aircraft type design when installed in the aircraft.

c. If the modified article is produced under the provisions of Section 21.303, FAA-PMA, the article must be marked in accordance with the requirements of FAR Section 45.15.



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